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ANNUAL BANQUET OF NEW YORK ALUMNI

Technology's duty to the Nation discussed and the importance of scientific research presented

One of the largest dinners ever held by the alumni of New York City and vicinity took place at Hotel McAlpin on January 27. The Technology Musical Clubs, on their midyear trip west, stopped at New York and gave a number of selections at the dinner, which were heartily received. On account of sudden illness, President Ralph H. Howes, '93, was unable to be present, and Vice-President Frank C. Schmitz, '95, acted as toastmaster.

The first speaker introduced was President R. C. Maclaurin of the Institute, who spoke particularly of the part that science was taking in the great conflict abroad, and of the steps that had been taken to make the laboratories of the Institute a great clearing house for scientific research.

Dr. Hollis Godfrey, '98, president of the Drexel Institute of Philadelphia, and one of the seven members of the Advisory Committee to the Council of National Defense, spoke of the desirability of listing the Technology ability of the country in what he termed a personnel index, in order that men, who are particularly needed for specific technical work in connection with industrial preparedness, could be quickly secured.

Mr. Gano Dunn, president of the J. G. White Corp., represented the National Research Council, and spoke at length upon the importance of research to the progress of the nation. He especially spoke of the desirability of promoting pure research. Just now the country is looking forward to a possible state of war, and the demand for research is pressing. He spoke of the organization of the National Research Council, and of the things it hoped to accomplish. The various research laboratories of the country are being mobilized as are also the research workers.

George J. Baldwin, '77, president of the Pacific Mail Steamship Company, gave an address; he spoke on "International Merchant Marine," as follows:

The subject of the evening, "Technology's Duties to the Nation," is so large and includes so varied a line of thought, preparation and work that it seems impossible in the short space of one evening to more than barely outline a few suggestive ideas on one or two of its important phases. This duty is part of a general duty to the nation which we Americans have almost forgotten, the duty of national service, in which every young man and woman should be trained to take part. Perhaps my creed may be best expressed by a short quotation from Frances A. Kellor's "Straight America," which probably all of you have recently seen:

"I believe that every citizen of this republic, male or female, and of any age after childhood, should have a regular

scheme of duties, a regular enlistment for service of a definite nature, suited to his or her status of capacity, which he must be prepared to render upon demand, and which he or she must keep in training to deliver."

For the best welfare of a nation, military service must not be dominant but must be a necessary incident to a general national and industrial service. If we once accept the truth of these statements, then we can more easily see the duty of those of us who have been scientifically and technically trained and have thus prepared ourselves to give the skilled service we owe to the nation in times of peace as well as in times of war.

The efficiency of Germany in the present war is perhaps more largely due to the national service given by each individual throughout the country than it is to the men at the front. All other belligerents are learning this lesson thoroughly, and whether or not we wish to devote one or two years of our lives to such service, it seems evident that in no other way can we be fully prepared to maintain our position in the world.

The first immigration to this country came from Great Britain, and we are all inclined to think the United States is more closely allied in nationality with Great Britain than with any other section of the world. We have grown so fast that we have lost sight of the succeeding waves of immigration; the Irish, who at one time furnished the largest number, gradually being followed by immigration from the Scandinavian countries, and from Germany, then from Italy, and finally from the Balkan states. This has brought to our country people of many nationalities, and instead of being a homogeneous nation we are an unfused mixture, and perhaps our greatest need today is to nationalize and make all of these immigrants and their descendents thorough-going American citizens, whose first idea of duty is to the adopted nation which they are helping to create. I believe that a period of one or two years of compulsory national service will do more to assist in this ideal nationalization than any other one thing we may be able to do.

The need for some such service is further emphasized by the concentration and specialization of our industries and the growth of our tremendous corporate agencies for conducting business. In the old times when employer and employee sat on the same bench and worked side by side, they knew each other's wants and ideas and worked together for the common good, but today the president of a great corporation barely sees the laborers in the ranks. He knows almost nothing of their wants and desires, and they know nothing of his. The two ends have grown far apart with the resultant misunderstandings and differences of opinion, which tend to revolution. I believe that compulsory national service, by placing every citizen of this country upon an equal footing of duty and work during one or two formative years, will do more to bring about a complete understanding between all the people of this country than can be done in any other way. I see no other method of preserving the democracy of our ideals and our institutions.

When we think of the duties of Technology in connection with this broad service, we begin to see what we can do, and I now want to bring your thoughts to one particular duty among the many which I conceive to be as vital to our welfare, perhaps more so, than any other line of work or thought; the duty of assisting in the creation of a merchant marine, in which we may be able to transport our products and import those of other countries in peaceful alliance and competition with our countries. This seems to me our primary need at the present time. That of an armed navy to protect this merchant marine, as well as to be a defence against possible aggressions of other countries, seems to me a necessary sequence.

When we look back over the development of the country, we find the scientifically trained men of Technology taking a foremost part in every line of effort. They have opened our mines, smelted the ore, manufactured the metals, produced our tools, constructed our factories and all their necessary apparatus, operated

them, built our lines of transportation upon land and on the rivers and lakes, and finally constructed the cities created as a result of these various agencies. No less have we helped in the development of our agricultural system through the researches of our chemists, and in rendering available the products of our forests.

We have thus furnished no small part of the skill which has brought us to our present state of efficiency and produced the conditions which now make it necessary that we should find some method of transporting our surplus products in foreign trade in vessels built by us and not owned and operated by our competitors. The creation of a merchant marine is the next important duty before you.

Ample funds will shortly be at the disposal of the Institute to enable it to take its part in this particular duty and enable it to make its School of Naval Architecture and Marine Engineering second to none in the world. I believe both Technology and the country at large to be now prepared for this important step, and perhaps I had best tell you why this is true at this particular moment. When the first settlers reached the shores of New England, they found before them the forests and a soil not especially bountiful in its gifts to man. It was, therefore, natural for them to earn their living from the sea, and in doing this boats and shipping became necessary, for which the forests furnished the material, so that in those early days almost every man became familiar with the sea and with shipbuilding. He followed the industry from the cutting of the logs in the forest to the placing of them in the vessel by his own labor, for which he was paid by an ownership in the vessel upon which he afterwards sailed. This produced a race of hardy sailors skilled in ship construction and operation, intensely interested in their ventures because of personal ownership, thus furnishing every incentive for the utmost personal effort, which logically resulted in the best efficiency. Thus began the foreign trade of the United States, starting at the fisheries, transporting their products to the West Indies, to Great Britain and the Orient, then bringing back the products of those countries. By 1796 American tonnage was nearly 600,000 tons; 90 per cent. of our exports were carried in our own ships, and 94 per cent. of our imports brought back by them, a history of growth in shipping without a parallel in the history of the world, to preserve which we fought the war of 1812 and became the most successful maritime nation in the world's history. We all remember the history of those great clipper ships, the *Rainbow*, the *Flying Cloud*, *Challenge*, *Northern Light*, and others, which enabled us to keep the maritime control of the ocean until shortly before the Civil War.

By this time, however, our people had spread inland. They were engaged in developing the tremendous resources of the country. The production of iron and steel in America was in its infancy, and while our people were gradually withdrawing from the sea, the age of steel and of steam forced England to take her place upon it. While we could build wooden ships cheaper than she, her rapidly developing industries in coal and iron enabled her to produce a cheaper cargo carrier than could be built in this country, and from that time until this her supremacy in the ocean trade of the world has been undisputed. This has permitted the construction of vessels in such large volume that individual shipbuilders were able to specialize and construct in large numbers only one type of vessel, thus giving them the opportunity of cheaper ship construction than any other nation.

We have learned the same lesson in other lines, principally in the manufacture of machine tools; that is, tools designed for the manufacture of locomotives, boilers, engines and all other kinds of metal work. We now make the cheapest and best machine tools in the world, and this is the foundation of our manufacturing industry. Because of this we have been able to take the lead in manufacturing automobiles, sewing machines, watches and a thousand other specialized manufactures in such volume as to be able to lead in the world's trade in these particular classes of products.

Today we owe our manufacturing position to our skill in the design of machine tools, the efficiency of their operation, and the volume of the product we are able to turn out by their use.

We have had one opportunity of specializing in ships. The traffic on the Great Lakes protected by law required that Americans should construct American ships to transport coal, ore and wheat, and because of this protected condition we have been able to produce upon the Lakes cargo carriers moving freight at less cost per ton mile than any other agency anywhere else in the world.

No country produces steel, coal, copper and all of the various raw products entering into the manufacture of vessels more cheaply than we do. Our country from one end to the other has been more fully developed. Our machine shops and technical industries have grown to a tremendous volume, and our skill today in the manufacture of machine tools and other labor-saving machines surpasses that of any other nation. Nor is our inventive capacity far behind it. We are economically and industrially prepared to begin our struggle for our place upon the ocean. The volume of our foreign trade is immense, is growing, and will continue enlarging. We are becoming more and more a manufacturing nation and must amplify our trade with the newer countries still in the agricultural period of development, and just at this time in our commercial history, when we stand fully prepared to do this, a flood of wealth is accidentally poured into our hands as one of the results of the European war. Our surplus manufactured product is being delivered to these nations, and we are today extending credit to them in lieu of the cash they are unable to pay.

We have arrived at a crisis in our commercial history. If we fail to take advantage of it, the country cannot continue its present progress, but if we grasp it, our trade may become far extended.

What better course can we pursue than to turn our surplus product into the construction of merchant ships, so that we may again carry over 90 per cent of our foreign trade in American bottoms? We shall be prepared for any contingency which may befall us, when to this merchant fleet we have added an armed navy capable of protecting it.

Can there be any more vital duty of Technology than to give her sons to the service of the nation in carrying out this program?

While the people along our coasts are more or less awake to this need, those of the interior have only just begun to think of it, but the present scarcity of ocean tonnage and the high costs of ocean transportation consequent upon it have been brought home to everyone, and I believe public opinion is awakening.

The specific duty of the School of Naval Architecture and Marine Engineering is to assist in cheapening the constructive cost of our vessels and to increase their economic efficiency in operation. The cost of ship construction today in the United States is no higher than in competing maritime nations, but this is an abnormal condition of which we must take present advantage, and during this period we must learn to construct our ships as cheaply as those of England, Germany, Scandinavia and Japan. Beginning with the training of our young men during their undergraduate course, we must coördinate this theoretical education with practical work in our shipyards, so that on graduation our naval architects and marine engineers will be best qualified for their part in this work. Our shipbuilding corporations must coöperate with the schools and with each other in order that each yard may be able by this coöperation to reduce its cost of construction. Our laws must be so modified as to permit the most economical operation of the ships we construct. Our bankers must teach the people the necessity and wisdom of investment in our merchant marine, and finally, the entire power of the United States government should be added to our other agencies in order to encourage in the fullest possible manner the growth of our ocean transportation system so vital to the needs of this country. If we do these

things, our future is assured, but if we fail in one of them, we shall lose our opportunity perhaps never again to secure it.

England is now engaged in nationalizing her entire shipping for the purpose of using it not for competition between British subjects but as a unified instrument directed from one central source and operated for the benefit of the nation. Can we compete with this unless we are permitted to follow along lines of concentration instead of unlimited competition between ourselves? Japan is taking possession of the trade of the Pacific Ocean. She subsidizes her shipbuilders and her shipping companies, and is today in control of the bulk of the traffic on the Pacific. Norway has been concentrating the enormous profits earned by her vessels, and a large proportion of the merchant shipping now under construction in American yards is being built with this money for her benefit.

The plain duty of Technology to the nation is to continue the work it has so well done in the past. It has enabled us to utilize our resources, create our manufactures and transport them to tidewater. It must now take up the duty of providing the ships for the transportation of these products to the markets of the world.

Technology's Census

The Committee on Mobilization of Technology's Resources sent out, on February 27, a question sheet to every alumnus, for the purpose of finding out how each man can best help the country in case war is declared, as well as for industrial defense after the war.

This question sheet is so arranged that it will serve also as an industrial and employment record and will be found very useful where requests come for older men to fill important positions in industry. The principal object of the sheet is to find the most important service that each man can give in case of war and to aid his judgment in this matter. There are three sheets, covering the entire professional and industrial field generally, which are indicative. There are twenty-five generic divisions, each one subdivided into a number of classes and this in conjunction with an experience sheet on which the man is asked to describe the most important kinds of work that he has done. It is expected that each man can be properly classified.

The plan for indexing is complete, and when calls come from the government for different kinds of men needed, it will be a comparatively easy matter to pick them out from this index. The general plan is very different from the others that have been sent out because it is possible not only to get a very good analysis of a man's ability but to so index him that he can be readily found when the place where he can best serve is to be filled.

Honors For Benefactors

Technology has officially honored two of her benefactors by carving their names on the buildings facing the east and west courts which lead from the large central court. The west court has been named in honor of Coleman du Pont, class of 1884 and the east court in honor of Augustus Lowell. Coleman du Pont has contributed $1,100,000 up to the present time for the new buildings.

Augustus Lowell was one of the early benefactors of the Institute, presenting to the school the Lowell buildings on Clarendon street which long housed the electrical engineering laboratory.

Engineering Buildings Sold

The Park Street Real Estate Trust has purchased about 400,000 square feet of land in the vicinity of the Trinity Place Institute buildings, including the Institute property itself, and will develop the tract this summer.

It is proposed to widen Stuart street and later cut Clarendon street through to Columbus avenue with a bridge over the railroad tracks. A suggestion is made that a large hotel will be built on part of this property.

ENGLISH FOR THE ENGINEER

A description of our English Course at Technology by Professor Aydelotte

Our elementary English course at the Massachusetts Institute of Technology, and especially that part of the first year's work which I have been asked to describe for the *Engineering Record*, might be characterized as an attempt to translate a certain demand, which is voiced on all sides by successful members of the profession, into a practical measure of engineering education. The question as to the kind of an English course engineering students should have depends upon the larger question whether one takes a narrow or a broad view of the vocation for which these men are being prepared. One may regard the engineer as a high class mechanic, not a scientist but a man who has mastered certain principles of science which can be turned to industrial uses, an expert, somewhat set apart from mankind in general, whose field is the world of dead matter and force, which he manipulates under the direction of other men without much regard to the general human significance of his work. On the other hand, one may regard him as a member of an intellectual profession which has for its object the control of the human as well as the material forces of nature, which has or is now forming a code of ethics according to which it will develop those sources of power in nature for the use of man—a profession the members of which, working in co-operation, consider themselves the trustees of the whole body of natural knowledge placed at their disposal by modern science, and who consider their duty to be to add to this knowledge and to use it for the realization of the highest aims of society.

No reader of any large number of the essays and addresses in which practical engineers of the present day discuss these problems can be in doubt as to the direction in which they would have the profession go. That engineering is an intellectual profession, the mission of which is to be one of leadership in working out the problems of the modern world and in serving its highest interests, is the claim of many of the most distinguished engineers of the day; and these men demand from engineering schools not merely technical proficiency but also that development of character and that liberal cultivation, that capacity for original thought about human as well as material problems, which will enable technical graduates to play a worthy part in the engineering world when the period of their practical apprenticeship is ended and they are ready to take the places vacated by the present leaders.

This high conception of the profession of engineering is, of course, the fundamental justification of literary studies in a technical school; and it seems very important, in the practical teaching of English literature and composition, to make clear at the outset the bearings of this study on the wider usefulness of the engineer. The course about which I have been asked to write is planned with exactly that aim in view. The case for composition is in the end the case for literature. The widespread demand that our college men, graduates of technical schools and of colleges of liberal arts alike, should be better able to write and speak their mother tongue is really a demand that they have a better literary education. A man's writing reflects his habits of thought, and it is simply impossible to give him a cultivated style by any other method than by making him a cultivated man.

The average engineering student has too narrow and too mechanical a view of his future profession. He does not hold this narrow, materialistic, mechanical opinion of his calling as a result of thought and choice, but rather vaguely, from lack

of thought, in obedience to a real or imaginary spirit of the age (perhaps one ought to say, of the age which is just now passing), which it has never occurred to him to criticise. He is ready to take hold of a broader conception with all the enthusiasm and ardor of youth once it has been pointed out to him.

We begin our study of English literature at the Institute of Technology with some consideration of the status and significance of the profession of engineering. Using as a basis some essays by practical engineers, we ask our students to consider the question whether engineering is a trade or a profession, what the difference implies, what is the meaning of professional spirit, how the ethics of existing professions differ from those of business or of the mechanic arts. We pass from this, again using as a basis for our work the writing of various men prominent in the engineering world, to the question of engineering education: What kind of training is necessary to fit a man to take a worthy place in the profession if it follows the lines laid down by the leaders of the present day? We ask the student to compare his own aims in entering a technical school with the professional demand as codified by Dr. Mann in his recent investigation of technical education conducted on behalf of the Carnegie Foundation and the five national engineering societies.

The object of all this work is to make the student think more seriously about his own vocation and the preparation he needs for it. Instead of telling him what he should believe, we undertake to make him think it out for himself. We do not hand out his ideals to him for the reason that he will not act on them unless they are his own. We ask him constantly to discuss these questions as they look to him, orally and in his themes; they are, of course, questions on which it is very important that he should have an opinion and they are questions which excite his keenest interest.

Following the topic of engineering education we pass to that of pure science versus applied. Is the interest of the engineer solely in *how* things are done, or is it also in the *why?* What is the relation of practical engineering to scientific research? Is the work of the engineer the application of established formulæ to practical problems, or is it the solution of problems by scientific methods? As a basis of all this work we use essays by scientific men, and we ask the class as before to discuss in writing and speaking the application of these ideas to their own situation and their own studies.

Finally we come to the question, What is the relation of science to literature? Here we ask the class to read a set of essays by scientists and literary men dealing with this subject and to work out in their discussion the relations between these two great bodies of thought which divide between them the material of our civilization. Each stage of this progress from engineering to literature harks back to all those preceding, and the whole ties itself together in a connected train of thought which these paragraphs will suggest, though, of course, enriched and diversified and illustrated in ways which cannot be suggested in so brief an outline.

The end of the half year's work is to give the student some notion of these alternative conceptions of engineering which I alluded to at the beginning of this article and some idea of what each implies. The question is not settled for him, perhaps, but it is opened. There is a real connection between the various problems with which he has been confronted. That conception of engineering which tends to divorce it from literature and from human problems, on the one hand, tends to divorce it from science on the other, tends to make it more of a trade than a profession, tends to limit the usefulness of the engineer to society by restricting him to the performance of merely mechanical tasks. Even the elementary student will see this, especially when he hears it from the mouths not merely of his English teachers but of practical engineers as well. He will see it and, in most cases, he will form for himself a broader conception of his calling as one dealing with human as well as material problems and needing for its practice a humanistic as well as a technical train-

ing. He comes to realize the intimate connection of the work he has chosen with science on the one side and literature on the other. He conceives himself as having a place in the world not only as a money-maker but also as a man. He is brought to the point where he has some conception of literature as a comment on life, as the collected wisdom of the race for the solution of its problems, as one expression of that beauty which makes life worth living.

Ideas of this kind sound very "theoretical" and very far from practical class work in a practical engineering school. They may seem to the average reader all well enough for a lecture on poetry, where the lecturer may be allowed to say somewhat more than he means for the sake of emotional effect, but likely to pass high over the heads of technical students. As a matter of fact lecturing about them is the last thing we do. I can illustrate this by pausing for a moment to indicate more in detail how our work is conducted day by day.

Let us take, for example, the point with which we begin, the engineering profession. On the first day of the term, before the class has read anything on the subject, the instructor asks the question, What is engineering? All sorts of answers come back, mostly vague, or good answers quoted from somewhere but vaguely understood. Without saying dogmatically what is wrong and what is right (we dogmatize very little from one end of the course to the other), the instructor follows the first question with others: What is the difference between an engineer and a carpenter, or a plumber, or a research professor of chemistry? Is engineering a trade or a profession? What do these terms imply? What makes medicine a profession? As a result of an hour of such discussion, which is likely to wax very hot, the class is ready to read essays on the subject by engineers with avidity. These essays are taken up in class one by one and their bearing on the previous discussion brought out.

For a theme the class may be asked to explain the difference between some mechanic and some engineer whom they know in the flesh. Or the different members may state more carefully rival points of view which they have argued about in class. All this discussion serves two ends: It trains the men to think more clearly, criticising their own hasty opinions, and to say carefully and exactly what they mean. And the result of all of it, carried through the whole list of topics, is to build up in their minds a body of ideas which they would never catch from lectures or from reading unaccompanied by discussion. The function of the teacher is to direct the discussion and focus it upon the important issues. If he gives his opinion it is as an individual rather than as a source of authority. His purpose is to stimulate and bring out differences of opinion, objections, and contradictions, that the class may try them and decide on their validity. This method has more in common with that of Socrates than with that of the typical German professor. It is not an easy way of teaching, but it is extremely effective.

The volume of essays on which this work is based is arranged according to topics, with several essays under each, in the order in which I have taken them up. They are (excluding the first), "The Engineering Profession," "Engineering Education," "Pure Science and Applied," "Science and Literature" and "Literature and Life." This last section contains half a dozen essays illustrating in elementary ways the idea of literature as a "comment on life," and this forms a kind of summary of all that has gone before and as well a direct preparation for the further study of literature in the second year.

The first section of our collection has for its title "Writing and Thinking," and that title will suggest the method of the composition work which accompanies the reading. That work is based on the principle that the first rule of good writing is clear thinking. We grade our themes primarily on the ideas expressed in them. We do not neglect faults of expression, but our ideal is one of content as well as of form. Where faulty expression is due

to careless thinking, as in most cases it is, the trouble is traced back to its source.

For composition work of this kind the ideas about engineering and literature which we have been developing make admirable material. The men are interested and stimulated by them. The differences of opinion which arise make them eager to talk and to write. These conditions, the fact that they have something to say and the desire to say it well, are most important for effective work in composition. Of course, the men are unequal. It cannot be maintained that all students do well in such a course as this. To a certain type of mind the work seems "up in the air," with nothing tangible to learn and repeat, only ideas to discuss. The best students take to it keenly; the average men show marked improvement in the care with which they read and in the clearness with which they talk and write, while that student is dull indeed who does not produce some themes which are real expressions of his own thought and of his own personality.

This work we make markedly individual throughout. We encourage independence and try to be patient with every point of view. Every effort is made to induce the student to think for himself. To this end we find a large number of personal conferences, which are a tradition of the English department at the Institute, of the utmost value.

Work of the kind which I have just outlined seems to us, as I have said elsewhere, to have more value for strictly technical purposes than a course occupied exclusively with what is called "technical writing." No matter what the subject to be discussed the problem of writing is much the same. The student who can think straight, who can handle complicated ideas, who can balance arguments and marshal them to the support of his conclusions, can handle any technical subject within the range of his technical ability.

This does not mean that the student will not get great value from instruction in technical writing.

There are, of course, tricks in every trade, but the tricks are much easier to acquire and much less important than general intelligence. There is no "foolproof" method of writing engineering reports. An engineer who relies on a stereotyped form will turn out a machine-made product, devoid of real vitality. The problem is one of common sense, of perspective, of power of clear thought and clear expression, and of imagination to grasp the point of view of the man who is to read the report.

But the value of the work I have described is not limited to its bearing upon the actual writing which the engineer must do in the practice of his profession. Even more important is its educative value to the man, the approach it gives him to literature, the intellectual interests which it opens up to him, not as matters foreign to his work but as vitally connected with it. If the engineer is to have his full value to society he must view society broadly and address himself to the solution of its problems, human as well as material. In the education of this broader engineer, whom society so badly needs, the study of the mother tongue must be more than the acquirement of facts or a superficial accomplishment; it must be a training in thought, the influence of which is to clarify and humanize the student's character and his aims in life.—PROFESSOR FRANK AYDELOTTE in the *Engineering News*.

Dr. Keyes Returns to Tech

Dr. Frederick G. Keyes, who has been associated with the Cooper Hewitt Electric Company for the past two years as chief engineer, has severed his connections to take charge of the research laboratory of physical chemistry at the Massachusetts Institute of Technology. Dr. Keyes still continues with the company in a consulting capacity.

R. D. Mailey, who has been Dr. Keyes' assistant, succeeds him as chief engineer. Mr. Mailey will be assisted by Dr. W. J. Winninghoff, formerly of the Massachusetts Institute of Technology research laboratory, and until recently connected with the Anaconda Copper Company.

DEVELOPMENT IN THE COURSE IN NAVAL ARCHITECTURE

Strong advisory committee of prominent shipbuilders appointed—Building for the future

For its part in the program of naval preparedness in the country the Massachusetts Institute of Technology has taken quick and what is likely to be efficient action and, as has been the rule where Technology is concerned, the action has not only consideration of the present but looks well into the future. The instant action has been the furnishing of available quick resources for shipbuilding, the prophetic phase will include what may be termed a naval architecture experience and the invitation by the Institute to five leading men high up in maritime corporations to form an advisory committee to work with it. The membership of this committee is Joseph W. Powell, president of the Fore River Shipbuilding Co.; Homer L. Ferguson, president of the Newport News Ship Building Co.; Charles P. Wetherbee, '91, vice-president of the Bath Iron Works; James Swan, '91, of the Herreshoff Manufacturing Co.; and George J. Baldwin, ''77, vice-president of the American International Co., and president of New York Shipping Corporation, and these gentlemen have all accepted the invitation to coöperate with the Institute. The committee, while it will be of great advantage in the present juncture, is to be permanent and is another link in the close relationship which Technology is forming with the different industries.

Those who are cognizant of the status of the shipbuilding business in the country are well aware that it is in a critical condition, and President Maclaurin feels assured that aside from the temporary impetus of the present rush, the future of American shipbuilding will be made or marred during the next few years. This is the psychological moment for the work of development. It is fit, therefore, that the Institute, which stands in such high repute that all United States naval constructors are obliged by law to take its courses and from other countries graduates from local academies come to it for finishing work, should take counsel of leaders in the shipbuilding industries.

More than perhaps any other department of study at Technology, naval architecture must look into the future. The reason for this primarily is that when demands come, as they have at this moment, it is too late to begin the preparation of men for the special work; they must be ready. It is on account of the far-sightedness of the Tech administration that the country is as well supplied as it may be for the emergency. From its courses in naval architecture have gone forth the majority of the men who, as naval constructors, must oversee the building up of the navy, and in the allied studies of aerodynamics it is significant that the leaders in the aeronautic section of the signal service are in greater part Technology men.

What the Institute has been able to do on the instant is to furnish men already trained to most essential work. The time of graduation of the seniors is only two months away and these students are but little below the finished product and are already competent engineers. In the demand for men with knowledge of naval affairs, the United States naval constructors were naturally called out first, but immediately all the other members of the senior class in these courses were placed in navy and shipbuilding yards. These young men will not lose their degrees, but will receive them in June as if they had continued in Tech itself, provided, of course, that their records are good. The Institute is therefore today cutting an important though unostentatious figure in the naval emergencies that the declaration of war has brought upon the nation.

The problems that confront the country in its shipbuilding future, according to President Maclaurin, include competition by means of cheaper labor abroad, and legislation. In the past this country has been able to meet the problem first-named by its inventive genius, which has evolved more efficient methods of handling men and materials; the problem of legislation rests on the demand of the people. The Institute will do its part in preparing young men for work in naval architecture and will do this in intelligent fashion through the coöperation of industrial authorities who will be able to keep the educational work in complete accord with the practical needs of the business world.

Tech Interim Course in Naval Architecture.

It is already well known that the students at the Massachusetts Institute of Technology who were taking courses in naval architecture and marine engineering have already been placed in navy and shipbuilding yards where they are putting their energies at work without loss of time towards the preparedness of the country for whatever may come as the result of the break with Germany. A further step in this direction is very soon to be taken which will be in the nature of an interim course in naval architecture. Professor C. H. Peabody, head of this department at Tech, thus outlines the special course:

An urgent demand for naval draughtsmen has been issued by the United States government. To qualify men to take such positions in navy yards or in shipbuilding yards the department of naval architecture and marine engineering at the Massachusetts Institute of Technology will establish an interim course of instruction beginning April 23 and closing June 30. Lectures will be given in theoretical naval architecture and in ship construction and instruction will be given in the drawing room in ship design and construction. This course is open to seniors in the engineering courses of the Institute on recommendation of the heads of departments. Other persons interested in such a course may apply to Professor Peabody at M. I. T., Cambridge.

That Tech can so quickly rise to meet the demands that are presented to it is an evidence of its normal condition of preparedness, and in fact its whole course of study is towards enabling engineers to cope with the problems that they may meet in the course of their experience. The various engineering studies have to so great an extent a common foundation that the interim course of ten weeks has been arranged without difficulty to fit in with the others, although of course it is special and intensive.

The emergency course will be especially inviting to students in mechanical and electrical engineering, and is to include two hours a day of lectures, five hours of drawing and three hours of preparation. That it may be understood in all its relationships Professor Peabody has already addressed the mechanicals and electricals, and immediately following the recess of junior week the new work will be taken up.

The demand to which Professor Peabody refers is that voiced in a circular of the Civil Service Commission issued by its president, John A. McIlhenny. It first notes that the need of the navy for draughtsmen is urgent. Money is available for construction of ships both new and already under way, but there is scarcity of draughtsmen, and the circular describes the nature of the tests required of applicants, and states that those who are found qualified will be given employment at once. The circular is no ordinary request, but is an appeal to patriotism in a national crisis and the time when these draughtsmen are needed is now. By means of its quickly arranged interim course Tech will be able to do a large part towards filling an urgent need.

Constructive Selection

The object of the census now being taken by the mobilization committee is to offer to the Government picked men for the important places to be filled rather than to find places for our alumni.

THE PRESIDENT'S ANNUAL REPORT

A prolific year in the history of the Institute—Some important developments

In his annual report to the Corporation, President Maclaurin of the Massachusetts Institute of Technology takes occasion to review the successive steps which have led up to the establishment of Technology in its new buildings on the Cambridge side of the Charles river.

"The event that overshadows all others in the past year," writes Dr. Maclaurin, "has been the realization of the hopes and dreams of many years through the occupancy of a great group of buildings on a site that is ample for present purposes and that gives room for large expansion in the future." The first practical step towards this end was the securing of the help of the Commonwealth of Massachusetts "to carry the Institute through the straits of its physical expansion, without which assistance we should have been in real danger of running on the rock of educational impoverishment."

As soon as this aid was assured, Coleman duPont made his timely and generous gift of half a million which made it practicable to begin negotiations for the purchase of a site. This generosity stimulated others and it was not long before sufficient funds had been obtained to secure the present magnificent property of fifty acres. "Once here," continues President Maclaurin, "it is more generally recognized than ever before how admirably suited is that site for all our purposes."

After the purchase of the land the next great step was taken when Mr. "Smith" made his munificent contribution to the building fund. The work was undertaken at a fortunate time for it was in a depression and land and materials were secured at very low figures. In spite of this fact, on account of the immensity of the undertaking the total cost has reached very considerable dimensions, the whole, including land, filling, draining, structures and equipments, being above seven million dollars.

The Institute has here been further fortunate financially, and this through forethought and preparation largely, in that the constructions, while affected by the unprecedented increase in the costs of everything, were so well advanced that the earlier economies have balanced the later increases so that the whole expenditure has been very close to the original estimates.

"It is specially gratifying," writes the President, "that we have been enabled to carry through an undertaking of such dimensions without encroaching at all on the slender endowment of the Institute. Indeed, during the period of construction and before the dedication in June last, the Institute has made substantial additions to that endowment."

The President briefly reviews the events of dedication week and turns next to the great alumni banquet, popularly known as the "telephone" dinner, from the unprecedented long distance and multi-auditor accompaniments. At that banquet Dr. Maclaurin announced the further splendid gift by Mr. "Smith." He had already contributed three and one-half millions and at that time offered to give five dollars for buildings for every three that any one else would contribute for endowment. The time limit for this extraordinary offer was January 1, 1917, and the cash limit, two and one-half millions. As soon as this offer was made known the alumni responded by gifts of a million dollars, which were announced at the same dinner. These contributors were Pierre S. duPont $500,000, Irenee duPont $100,000, Lammot duPont $100,-000, Coleman duPont $100,000, Charles Hayden $100,000, Edward F. Adams $50,-000, Charles A. Stone $25,000, and Edwin

S. Webster $25,000. These amounts have been paid to the Institute and before the end of the year the remaining half-million, necessary to secure the maximum amount offered by Mr. "Smith," was in the Institute's hands. It is interesting here to note that within three days of the beginning of the New Year, Mr. "Smith's" check was also received.

In looking over the other affairs of the Institute, President Maclaurin notes that the real estate comprising the buildings on Garrison street has been disposed of, and that negotiations "are in progress" with reference to the buildings on Trinity place and Clarendon street. These since the report was penned have also been sold. The President speaks of the establishment of the department of architecture in the Rogers building and on the new site the opening of the dormitories which accommodate about two hundred men.

In the educational section of his report Dr. Maclaurin outlines the new step in sending students into industrial plants for work and research as a part of their studies. This plan has been in operation about two months, the students now being at the second manufactory in the circuit which they all will make.

In his consideration of the problems of the future the President speaks of the need of strengthening the Institute as a center for research, indicating his idea by the suggestion that Technology should be not merely "a Massachusetts but a National Institute of Investigation." He looks forward to increased demand for space by the students in chemical research and forecasts a building for them as probably following the Pratt School for Naval Architecture that has recently been provided for.

Highway engineering is a department of great importance which is demanding increased facilities for instruction and investigation, while a third problem is the department of public health. It has done excellent work with the equipment at its command and its graduates have reflected great credit on Professor Sedgwick and Technology.

The extension in coöperation with Harvard University in the School for Health Officers, is doing also the best of work, but the needs of the country demand more,—and such considerable extension here as in the other departments is not possible without corresponding increases in endowment. These endowments are Dr. Maclaurin's problem for the immediate future.

Facilities for High-Tension and Radio Tests at the Institute

A feature of the equipment of the electrical engineering department in the new buildings of the Institute is a transmission span of three power conductors suspended between two steel towers, about five hundred feet apart. This is a replica, in mechanical details, of a standard span in the Big Creek line which transmits energy at 150,000 volts from a hydraulic plant in the Sierra National Forest to Los Angeles, a distance of 240 miles, and was the gift of Stone & Webster, Boston.

A 15-kilowatt, 100,000-volt transformer, located in a transformer house at the base of one of the towers, enables tests to be made with high voltages. Energy is obtained from the Cambridge Electric Light Company's 1,000-volt line.

Besides being serviceable for high-tension tests, the span makes an excellent antenna for radiotelegraph, and research along these lines is carried on in the transformer house when the span is not in use for high-tension tests.

In the electrical laboratory of Technology is an artificial power transmission line and an Alexanderson high-frequency generator. The line consists of twenty-seven specially wound inductive units. each occupying a separate shelf or compartment.

Each unit corresponds to thirty miles of overhead copper conductor of 250 square millimeter cross section. When all the coils are connected in series they represent one of the three conductors of a transmission line 780 miles long.

Many valuable researches in the field of electrical transmission have been made on this line under the guidance of A. E. Kennelly, professor of electrical engineering.

ANOTHER INDUSTRIAL CONNECTION

United States Smelting Company enters into a research arrangement with the Institute

While offering every facility of the great laboratories of the Massachusetts Institute of Technology to the United States government for any research in which it with its staff of trained professors can be of service, President Maclaurin has not for a moment forgotten that next to the education of its students Technology has an important function in being helpful to the industrial world. One after another, according to their opportunities, the great laboratories have swung into research work, and this is to be a most important factor towards maintaining the position of our country in the industrial struggle that is certain to follow the existing war. An agreement with Technology by the U. S. Smelting, Refining and Mining Co., to be in force in April, whereby the latter is to avail itself of the laboratory facilities offered by the Institute, is the latest step in forming closer relationships with the industrial world.

The growth of this coöperation with industries is an interesting story at Technology. Mechanical engineering, the most obvious point of contact between education in schools and the workaday world, began during the very first years of the Institute the solution of engineering problems. On the earlier experiments with the strength of materials are founded the first Massachusetts laws regulating building and other forms of construction and these themselves were the pioneer laws for the country. Electricity as a study came into touch with public engineering problems as it developed, but the construction of the fine Lowell laboratories on Clarendon street put the Institute into full accord with the electrical industrial world. That this is appreciated is evidenced by the gift to Technology of the incomparable Vail Electrical Library and the support of important researches. Chemistry began like mechanical engineering, as the foundation stone of the public health structure, but the larger developments which the modern industrial chemistry demands were obliged to go slowly until in its Cambridge home the Institute had space for the requirements, for laboratories demand room. Very recently most important steps forward in chemical education have been taken through alliances with great industrial plants to which the Tech boys go to study and investigate commercial processes and on the commercial scale. Freed from the space limitations that were only too obvious in the basement of the Rogers building, the department of mining and metallurgy only a month or two homed in its new buildings in Cambridge, is already in close touch with the mining industries on which depend the development of sources of wealth beneath the ground in every part of the country.

The U. S. Smelting Co., a Boston controlled corporation, is one of the two great companies of the kind in this country. With the ability of Technology to undertake the work, it has expressed itself, through its president, William G. Sharp, as desirous of availing itself of the advantages offered by the Institute. This great company, instead of establishing a private research laboratory of its own, will bring its problems to Technology.

The advantages which accrue to any corporation which makes such an agreement include the economy afforded by not being obliged to establish a laboratory paralleling that of the Institute. Such laboratories are very costly, construction and equipment running into the scores of thousands. The Institute presents a further advantage that no private laboratory can afford, in that it maintains a

great group of allied laboratories in which there is plenty of everything. There are unlimited quantities of water, steam, electricity and anything else that is needed, a great and unequalled library, a very large active force for investigation in the student body and unequalled facilities for quick and satisfactory conferences with the instructing staff. Then there is the ease with which other laboratories may be called to help in the solution of any problem.

So related are the different industries that hardly any problem lies entirely within the sphere of only one of them. Chemistry turns to electricity, metallurgy to both of these, while mechanical engineering is fundamental to all other lines of engineering. All of these different forces, a combination unequalled in the world, may at Tech be focussed on a single question.

On the other hand there are advantages to Technology. It has a very costly equipment which it really holds in trust for the community. It is the duty of the officers of the Institute to make the fullest returns possible, and they should work towards the end of making the school a hundred per cent. institution. Every use of its facilities by the industrial world is a step towards the realization of its ideals.

Coöperation like that with the U. S. Smelting Co., in the solution of industrial problems, makes it the more valuable to the people, and the more valuable it becomes the better the chance of greater importance in the future, with the better outlook for what is a crying need in this country, the carrying forward of research work that may be of general benefit. And that the latter may truly be assured the Institute has incorporated in its agreement the provision that publication of results be not unduly delayed.

To carry on the special work which this coöperation necessitates, the Corporation of Technology has named Henry M. Schleicher, B. S., a graduate of 1910, to be research associate in charge of the work, the general direction resting on Professor H. O. Hoffman, professor of metallurgy, in charge of the department of mining and metallurgy. Mr. Schleicher is a Roxbury boy, who since his graduation has been engaged in research work with two Boston firms, with especial attention to electrolytic separation and flotation.

Out of-door Graduation Exercises

For the principal novelty at the graduation exercises at the Massachusetts Institute of Technology there will be the first opportunity in a long time to issue admissions for all who wish to attend, for it is proposed to hold the ceremonies out-of-doors, in one of the smaller courts of the great structures in Cambridge.

For the purpose the Lowell Court has been chosen, the one farthest away from Massachusetts avenue, and here at the entrance, below the name of the family that has been represented on the Technology Corporation since the beginning of the Institute, is to be erected a dais for the Faculty and honored guests and for the speakers. Lowell Court has been chosen over du Pont Court on account of the position of the sun at the time the exercises will be in order.

These exercises will be followed by the usual reception by the President, and visitors will then be free to wander through the buildings and laboratories, and the members of the instructing staff will be in their respective departments to meet parents and friends.

The out-door occasion will have great advantages in the event of the usual June weather, and will lend dignity and attractiveness to the ceremonies, with the picturesque feature of the cadet battalion for aides and ushers.

In case of rain, the exercises will of necessity be held within the building and the largest present auditorium, 10-250, beneath the dome, will be used. There is room here, however, only for Corporation, Faculty and graduating class, and the exercises will be shortened by omitting the theses. The buildings will, however, be opened to parents and friends the same as if pleasant.

SENSIBLE ATTITUDE OF THE UNDERGRADUATES

A special committee studies the War situation and recommends a student program

The report of the All-Technology Undergraduate Preparedness Committee as presented at the students' mass meeting by Kenneth C. Richmond, '17, in behalf of his fellow workers on the committee, contained a word of advice to his fellow students against hasty action in case of a struggle with Germany. Looking at the matter as a problem in engineering the committee finds evidences that a rush of technically trained men to enlist in the ranks would be a mistake. The reasons for this are plainly set forth, that it is unlikely that the United States will take an active part in the war, but like Japan at the present moment will be rendering services of another kind. It will therefore be better service to the government for the students to remain at the Institute. This is the more evident since the experience of Germany was not to call undergraduates from colleges at the beginning of the war, in fact there is some evidence that they have not yet been called out. England on the other hand, made the mistake of permitting men with special qualifications to enlist when they would have been much more useful behind the lines.

The committee recommends to the Tech students that they wait until the demands of the fields of industry and research have been defined by war conditions. It further recommends that a committee be appointed to keep undergraduates constantly in touch with the national demand for technical service. It recommends further the examination of the students to determine whether they are physically fit for service in the army or navy. The class not fit for such service would prepare for definite industrial work. The class that is fit for service should prepare for such service even if in the end it should turn out that they may better be used for industrial work.

The committee advises students against underrating their ability to serve. The positions which they will be fitted to fill in industrial work are likely not to be materially different from those they would find in times of peace, unless the war should be severe. The responsibility is likely to increase more rapidly under war conditions, however.

For students who wish to enlist the committee advises against any group enlisting as a a unit. The objection is that it is a concentration of material of the same kind, and the diffusion of such material will ensure its better utilization. It seems to be a consensus of opinion that Technology men are well enough qualified to become officers in case of aggressive warfare, and in such exigency there will be opportunity for service of this kind. There may be short term enlistment opportunities for army, navy and marine corps.

Taking up the matter of the army and the possible relations of Tech students thereto, the report notes that while the army will probably not be called on for active service, it will undoubtedly be mobilized as a precautionary movement. Men who wish to enlist should enlist through the regular army Officers' Reserve Corps. Technical education will be most valuable in the Engineers' Corps, Coast Artillery and Ordnance Department. The field artillery, cavalry and infantry are decidedly second choice and arranged in order of preference.

With reference to the navy, the committee finds that it is more likely to see active service than the army. Here, however, the opportunities to enlist are limited because restricted to the capacity of ships available. Entrance to the regular navy or naval reserve is now possible only by enlistment as a seaman or fireman, entering a trade by examination as electrician, gunners' mate, etc.,

or taking examination for naval civil engineers corps.

With reference to the industrial field, the opportunities will depend wholly on the extent of the war, and this cannot be determined at present. M. I. T. students would find their best places as inspectors, supervisors, foremen, research assistants and machine factory designers. There might be some opportunity for men in the three lower classes to fill some of the positions, still, judging of what is known about Germany, it would appear as if they would be of still more use to their country if they complete their courses and become well grounded engineers.

In conclusion the committee restates in epitome its position, thus:

"Every Tech man should feel that he holds his life and his ability for work in trust for his country—to be rendered up at whatever moment and in whatever way would be most useful. Patriotism should be uppermost in every man's heart, but intelligent rather than blind patriotism. If at this moment the most intelligently useful course is to remain at Technology, every man should follow this course. When the time comes for action, as it surely will, men should act with only one thought and one desire—to do their utmost for their country to which they owe their own liberty and happiness."

The committee has further set before the students in permanent form various charts with reference to the organization of the army and the navy as well as a survey of the available industrial field.

Professor Edward Dyer Peters

Edward Dyer Peters, Gordon McKay professor of metallurgy at Harvard and of the Massachusetts Institute of Technology, died February 17, at his home at 38 Percival street, Dorchester. He had been in poor health for about a year past, yet had continued his work as a lecturer at Tech, and was there at his post, as usual, a few days before his death, which was unexpected.

Professor Peters, who was in his sixty-eighth year, was born in Dorchester on June 1, 1849, the son of Henry Hunter Peters and Susan Barker (Thaxter) Peters. He was graduated from the School of Mines at Freiberg in 1869, and received from that institution in after years his degree of doctor of engineering. That of M. D. was conferred upon him by Harvard in 1877. Previously, Professor Peters had become territorial assayer of Colorado, in 1872. He was a lecturer, in 1903 and 1904, of metallurgy and professor in this science at Harvard after 1904, and later became a professor at Tech.

Professor Peters was a fellow of the American Association for the Advancement of Science, a member of the American Institute of Mining Engineers and belonged to the St. Botolph Club and Harvard Club. As a writer he was the author of "Modern Copper Smelting," which has run through fifteen editions, also "Principles of Copper Smelting," as well as numerous technical and scientific monographs.

He was married on September 28, 1881, to Miss Anna Quincy Cushing of Dorchester, daughter of the late Dr. Benjamin Cushing of that place. Professor Peters is survived by his wife.

Alumna Plans President's Grounds

Miss Mabel Keyes Babcock, A. B., B. S., M. S., for the past four years on the faculty of Wellesley College and president of the M. I. T. Women's Association, has been selected to plan the garden that is to be a feature of the new residence of Dr. Maclaurin.

Miss Babcock, who was graduated from Wellesley, has created many beautiful garden designs throughout the country and planned many large estates.

The plannings for President Maclaurin's house are as yet merely tentative. The residence, placed in the angle of the dormitories, calls for a screen of shrubs. Since the garden will be on a level with the first floor, the conditions will permit of rather formal treatment, with vistas leading the eye to some bright, permanent decorations in relief.

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